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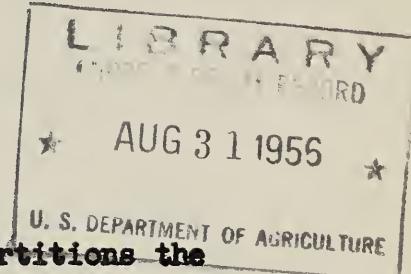
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DIGESTIBILITY OF CERTAIN CARBOHYDRATE FRACTIONS OF  
FORAGES BY RUMINANTS<sup>1/</sup>

by

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The conventional proximate system of analysis partitions the carbohydrates of forages into crude fiber and nitrogen-free extract fractions. Each of these fractions include varying proportions of the cellulose, hemicellulose and lignin from various forages. Holocellulose contains all of the cellulose and hemicellulose of forage after removal of the lignin. Previous studies have shown that cellulose and hemicellulose fractions of various forages have similar digestibility coefficients for ruminants.

The objective of this study was to compare the digestibility of the conventional crude fiber and nitrogen-free extract fractions of various forages with the digestibility of the holocellulose and total carbohydrate fractions that do not contain lignin.

Wheat straw, alfalfa silage, corn silage, and seven different hays were fed as the entire ration to dairy cows. The lignin ratio technique was used to calculate the digestibility coefficients of the following carbohydrate fractions; (1) crude fiber, (2) nitrogen-free extract, (3) holocellulose (cellulose and hemicellulose), and (4) total carbohydrates.

The digestibility coefficients of these fractions, the dry matter digestibility and the total digestible nutrient content of the forages studied are presented in Table 1.

Holocellulose was more digestible than the crude fiber fraction in all of the feeds studied. Crude fiber contains much of the indigestible lignin which is largely removed from the holocellulose fraction. The digestion coefficients of holocellulose ranged from 49.5 to 82.5.

1/ Paper presented at the annual meeting of the American Dairy Science Association, Michigan State College, East Lansing, Michigan, June 20-23, 1955.

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Wheat straw was the only forage that did not contain highly digestible carbohydrates. The holocellulose fraction accounted for most of the carbohydrates in wheat straw.

The calculated total carbohydrate content was more digestible than the holocellulose fraction in all of the forages except wheat straw. The calculated TDN content of the ten forages ranged from 36.0 to 70.5 percent.

Table 1.-Digestibility of certain fractions and T.D.N. content of various forages

Forage	D.M.	Crude Fiber	N.F.E.	Holo-cellulose	Total carbohydrate	T.D.N.
Wheat	21.2	44.6	34.6	49.5	45.9	36.0
Timothy hay	55.4	56.3	62.4	64.7	68.4	57.5
Corn silage	69.5	63.3	76.6	69.3	79.5	70.5
Clover hay	52.4	49.3	58.7	59.7	64.3	51.0
Mature orchard grass	57.1	59.2	56.7	64.0	65.2	55.5
Soybean hay	44.4	51.1	52.6	58.0	62.3	46.5
Lespedeza hay	59.2	58.6	63.9	71.2	74.0	58.3
Alfalfa hay	57.3	45.4	70.4	53.5	69.0	55.8
Alfalfa silage	58.5	54.6	60.0	66.5	69.5	55.8
Young orchard grass	71.8	75.0	73.7	82.3	80.6	70.3